

11 2639

O'Bryen, Barbara

From: Swope, Sheridan
Sent: Tuesday, January 20, 2004 12:41 PM
To: O'Bryen, Barbara *D. Swope*
Subject: 09/818,939

Barb, Would you align the following sequences?
All from NCBI

[NP_886873 </entrez/viewer.fcgi?db=protein&val=33599313>](#)

[NP_882677 </entrez/viewer.fcgi?db=protein&val=33595034>](#)

[NP_879578 </entrez/viewer.fcgi?db=protein&val=33591934>](#)

[Q57506 </entrez/viewer.fcgi?db=protein&val=34978374>](#)

[P15318 </entrez/viewer.fcgi?db=protein&val=34978355>](#)

Thanks!!

See my address below.

Sheridan Swope, Ph.D.
Patent Examiner, AU 1652
Recombinant Enzymes
sheridan.swope@uspto.gov
571-272-0943 (voice & FAX)
E03A70 Remsen Bld (Office)
E03A81 Remsen Bld (Mailbox)
400 Dulany Street
Alexandria, VA

TOIG of: np879578 check: 6141 from: 1 to: 1706

LOCUS NP 879578 1706 aa linear BCT 13-JAN-2004

DEFINITION bifunctional hemolysin-adenylate cyclase precursor [Bordetella pertussis Tohama I].

ACCESSION NP_879578

VERSION NP_879578.1 GI:33591934

DBSOURCE REFSEQ: accession NC_002929.2

KEYWORDS

SOURCE Bordetella pertussis Tohama I

ORGANISM Bordetella pertussis Tohama I

Bacteria; Proteobacteria; Betaproteobacteria; Burkholderiales; Alcaligenaceae; Bordetella.

REFERENCE 1 (residues 1 to 1706)

AUTHORS Parkhill, J., Sebainia, M., Preston, A., Murphy, L.D., Thomson, N., Harris, D.E., Holden, M.T.G., Churcher, C.M., Bentley, S.D., Mungall, K.L., Cerdano-Tarraga, A.M., Temple, L., James, K., Harris, B., Quail, M.A., Achtman, M., Atkin, R., Baker, S., Basham, D., Bason, N., Cherevach, I., Chillingworth, T., Collins, M., Cronin, A., Davis, P., Doggett, J., Feltwell, T., Goble, A., Hamlin, N., Hauser, H., Holtroyd, S., Jagsels, K., Leather, S., Moule, S., Norbertczak, H., O'Neill, S., Ormond, D., Price, C., Rabinowitsch, E., Rutter, S., Sanders, M., Saunders, D., Seeger, K., Sharp, S., Simmonds, M., Skelton, J., Squares, R., Squares, S., Stevens, K., Unwin, L., Whitehead, S., Barrett, B.G. and Maskell, D.J.

TITLE Comparative analysis of the genome sequences of Bordetella pertussis, Bordetella parapertussis and Bordetella bronchiseptica

JOURNAL Nat. Genet. 35 (1), 32-40 (2003)

MEDLINE 22827994

PubMed 12910271

REFERENCE 2 (residues 1 to 1706)

AUTHORS Sebainia, M.

TITLE Direct Submission

JOURNAL Submitted (06-AUG-2003) Submitted on behalf of the Pathogen Sequencing Unit, Sanger Institute, Wellcome Trust Genome Campus, Hinxton, Cambridge CB10 1SA E-mail: ms@sanger.ac.uk

COMMENT Method: conceptual translation.

FEATURES

source

1..1706

/organism="Bordetella pertussis Tohama I"

/strain="Tohama I"

/db_xref="taxon:257313"

1..1706

/product="bifunctional hemolysin-adenylate cyclase precursor"

/EC_number="4.6.1.1"

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/gene="cyaA"

/locus_tag="BP0760"

/coded_by="NC_002929.2:776228..781348"

/note="identical to the previously sequenced Bordetella pertussis bifunctional hemolysin-adenylate cyclase precursor Cya or CyaA SW:CYAA_BORPS (P15318) (1706 aa) fasta scores: E(0): 0, 99.941% id in 1706 aa, and to Bordetella parapertussis bifunctional hemolysin-adenylate cyclase precursor CyaA TR:Q9J469 (EMBL:AJ249835) (1706 aa) fasta scores: E(0): 0, 97.714% id in 1706 aa"

/transl_table=11

/db_xref="GeneID:2664492"

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SGDSVYIYLAIRTRASATGDLDERIDILWKIARAGARSAGTEARQRYDGMNIGVITDPELEVR
NALNRRAAVAGAOVNGTQNNPFEADKEIFVASTGDSOMLRQLEKXYIGQCGEGVYENYAY
GVAKSLPDDGIGAPVPSGRKSPDLVETVPSGLRPSICAVRQDSGLDVGSRSPSLGEV
SDMAAVEAALEMTROVILHAGARODAPGVGSAHMGARALQAGAAVAAORLVHAIAMTQGRGAS
TNTPOEASAAVEYGEASAVAVETSGFRGSGSRAGSGFVAGGMAAGGCIAAAVAGGCTTDDAP
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LITGALNGLRGVQPIETEKANDYARKIDELGSPQAFENKULARHQULANSQGLRMYADLOAGWNAS
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FITPLAAGEORRRTKTKGSEFTTEIVKQDRMRIRDSAAVITDILAVYQQLVANDLKHSLID
VIGGGDDVYANLSRHYDAGAGNTVTSYAAIGRODSITVSAGERNVKNVNNVREGVAGTCTTA
YGRLENVQYHVELLAVGLVEYDTELEHVIIGAGNDSITGNANHNPFLAGSGSDRLRAGAGNDTLV
GEGQNTVIGAGADVPFLQDGGVNSQNDGAGVDTYKYNHQSSEELRSGTGJADLOKGVKWP
ALNFSYVHVNININHSRLNDRILAGDQDNLMGHNGDNTIGRGGDILRGLGIDTLYGEDGNT
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WFOQYAREHVLNRGGDDVDVDSYQTAHAGIAGRIGLGILADLGAAGVXLGEGSSAYDFVSGIEN
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TOIG of: np882677 check: 4166 from: 1 to: 1740

LOCUS NP 882677 1740 aa linear BCT 13-JAN-2004

DEFINITION bifunctional hemolysin-adenylate cyclase precursor [Bordetella parapertussis].

ACCESSION NP_882677

VERSION NP_882677.1 GI:33595034

DBSOURCE REFSEQ: accession NC_002928.3

KEYWORDS

SOURCE Bordetella parapertussis

ORGANISM Bordetella parapertussis

Bacteria; Proteobacteria; Betaproteobacteria; Burkholderiales; Alcaligenaceae; Bordetella.

REFERENCE 1 (residues 1 to 1740)

AUTHORS Parkhill, J., Sebainia, M., Preston, A., Murphy, L.D., Thomson, N., Harris, D.E., Holden, M.T.G., Churcher, C.R., Bentley, S.D., Mungall, K.L., Cerdano-Tarraga, A.M., Temple, L., James, K., Harris, B., Quail, M.A., Achtman, M., Atkin, R., Baker, S., Basham, D., Bason, N., Cherevach, I., Chillingworth, T., Collins, M., Cronin, A., Davis, P., Doggett, J., Feltwell, T., Goble, A., Hamlin, N., Hauser, H., Holtroyd, S., Jagsels, K., Leather, S., Moule, S., Norbertczak, H., O'Neill, S., Ormond, D., Price, C., Rabinowitsch, E., Rutter, S., Sanders, M., Saunders, D., Seeger, K., Sharp, S., Simmonds, M., Skelton, J., Squares, R., Squares, S., Stevens, K., Unwin, L., Whitehead, S., Barrett, B.G. and Maskell, D.J.

TITLE Comparative analysis of the genome sequences of Bordetella pertussis, Bordetella parapertussis and Bordetella bronchiseptica

JOURNAL Nat. Genet. DOI: 10 (2003)

REFERENCE 2 (residues 1 to 1740)

AUTHORS Sebainia, M.

TITLE Direct Submission

JOURNAL Submitted (06-AUG-2003) Submitted on behalf of the Pathogen Sequencing Unit, Sanger Institute, Wellcome Trust Genome Campus, Hinxton, Cambridge CB10 1SA E-mail: ms@sanger.ac.uk

COMMENT PROVISIONAL REFSEQ: This record has not yet been subject to final NCBI review. The reference sequence was derived from CAB40062.

METHOD: conceptual translation.

FEATURES

source

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/coded_by="NC_002928.3:336053..341275"

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/transl_table=11

/db_xref="GeneID:1666419"

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 /trans_table=11
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 TMLDFVLPVPHSTSLIAEVAARKGVNAKSDMGLQGYIPVNPNTSLKLGRAEYVTAARDNPVNSLAIH
 CHTADLTLSERLDLYRQAGLVTMGMAGVVASNHAGEOPEFVKTSIDGRYAAYVORRRKGDDPEFAVK
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 ACARAVCTERARQORRYQDMNITVITDFELFVNALNRHANVAGADVVOHGBONNPPBADEKIFVY
 SATGSSQMLTREQLEYIGQORGEYVYENRAVAGAKSLFDGLGAPEVPGRRKSSPDVLETPAS
 PELRPSLGAVERDQSGYSDLDGVSRFSFLGEVSDMAVAEALMTROYLHAGADODPAEPVGSASA
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 RMAGFGVAGAGAAAGGQVLAALMPREYVGLVOQSHYADODLKLQOESSAYEGEDDALLAOYRKRTABG
 TSGLOVAGSAGAAAGGQVLAALMPREYVGLVOQSHYADODLKLQOESSAYEGEDDALLAOYRKRTABG
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 FLOGRVAGQPVYLVANAGGIDILASRKBERPALFTITPLAAGEORRRTKTSSEPTVEIYGVKQDRW
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 TOIG of: p15318 check: 6141 from: 1 to: 1706
 LOCUS np_886873 1740 aa linear BCT 13-JAN-2004
 DEFINITION bifunctional hemolysin-adenylate cyclase precursor [Bordetella
 bronchiseptica RB50].
 ACCESSION NP_886873
 VERSION NP_886873.1 GI:33599313
 KEYWORDS REFSQ: accession NC_002927.3
 SOURCE complete genome.
 ORGANISM Bordetella bronchiseptica RB50
 Bacteria; Proteobacteria; Betaproteobacteria; Burkholderiales;
 Alcaligenaceae; Bordetella.
 REFERENCE 1 (residues 1 to 1740)
 AUTHORS Parthill,D., Sebithia,M., Preston,A., Murphy,L.D., Thomson,N.,
 Mungal,K.L., Cerdano-Tarraga,A.M., Temple,L., James,K., Harris,B.,
 Quail,M.A., Achman,M., Atkin,R., Baker,S., Basham,D., Bason,P.,
 Cherevach,I., Chillingworth,T., Collins,M., Cronin,A., Davis,P.,
 Doggett,J., Feltwell,T., Goble,A., Hamlin,N., Hauser,H.,
 Holroyd,S., Jagers,K., Leather,S., Moutle,S., Norderczak,H.,
 O'Neill,S., Ormond,D., Price,C., Rabinowitsch,E., Rutter,S.,
 Sanders,M., Saunders,D., Seeger,K., Sharp,S., Simmonds,M.,
 Skelton,J., Squares,R., Squares,S., Stevens,K., Unwin,L.,
 Whitehead,S., Barrett,B.G. and Maskell,D.J.
 TITLE Comparative analysis of the genome sequences of Bordetella
 pertussis, Bordetella parapertussis and Bordetella bronchiseptica
 JOURNAL Nat. Genet. 35 (1), 32-40 (2003)
 MEDLINE 12910271
 PUBMED 22827954
 REFERENCE 2 (residues 1 to 1740)
 AUTHORS Sebithia,M.
 TITLE Direct Submission
 JOURNAL Submitted (06-AUG-2003) Submitted on behalf of the Pathogen
 Sequencing Unit, Sanger Institute, Wellcome Trust Genome Campus,
 Hinxton, Cambridgeshire CB10 1SA E-mail: mssanger.ac.uk
 COMMENT PROVISIONAL REFSQ: This record has not yet been subject to final
 NCBI review. The reference sequence was derived from CAB30822.
 METHOD: conceptual translation.
 FEATURES
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 /strain="RB50"
 /db_xref="taxon:257310"
 Protein
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 /product="bifunctional hemolysin-adenylate cyclase
 precursor"
 EC_number="4.6.1.1"
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 CDS
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collaboration between the Swiss Institute of Bioinformatics and
the EMBL outstation - the European Bioinformatics Institute.
The original entry is available from http://www.expasy.ch/spot
and http://www.ebi.ac.uk/spot

-----
[FUNCTION] This adenylyate cyclase belongs to a special class of
bacterial toxin. It causes whooping cough by acting on mammalian
cells by elevating cAMP-concentration and thus disrupts normal cell
function.
[CATALYTIC ACTIVITY] ATP = 3',5'-cyclic AMP + diphosphate.
[ENZYME REGULATION] Activated by host calmodulin.
[SUBCELLULAR LOCATION] Secreted.
[DOMAIN] The Gly-rich region is probably involved in binding
calcium, which is required for target cell-binding or cytolytic
activity (By similarity).
[PTM] Released in a processed form.
[PTM] Palmitoylated by CYAC. The toxin only becomes active when
modified in position Lys-983.
[SIMILARITY] In the N-terminal section; belongs to the adenylyl
cyclase class-2 family.
[SIMILARITY] IN THE C-TERMINAL SECTION; BELONGS TO THE RTX
PROKARYOTIC TOXIN FAMILY.
Location/Qualifiers
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/db_xref="taxon:520"
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/note="synonyms: CYAA, BP0760"
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/EC_number="4.6.1.1"
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/region_name="Domain"
/note="A, CATALYTIC."
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/region_name="Mature chain"
/note="CALMODULIN-SENSITIVE ADENYLYATE CYCLASE."
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/note="D->E,N,Y,H: LOSS OF ACTIVITY."
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/note="HEMOLYSIN (BY SIMILARITY TO E.COLI HEMOLYSIN
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/region_name="Domain"
/note="B, ALA/GLY-RICH."
860

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1001
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1015..1020
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1657..1706
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/region_name="Domain"
/note="D, ASP/GLY-RICH."

ORIGIN
p15318.pap length: 1706 January 22, 2004 13:14 Type: P Check: 6141
p15318
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HAGYGFPERVYKTSDBGRAVOYRRKGGDPEAVAVYVIGNAAGIPITADIDMALINPHLSNFRDSARSSVT
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SDSTVDYARTRRASATGGLDRERIDLMKIAAGARSATGTEARRQFRYDGMNIGVITTELEVR
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GVAGSLPDDGGAAPVSGSKSPDLVETFPASPGLRPSLGAVERDSGSDSLDGSRSFSLG
SMAVAEALMETROVLARODAEVGSAGAWGCRALOGQANAAVAAORLVAHALMTORGRAGS
NTPOBAALSLAAVREGLASAVATVSGFRSGSRMGAGVAGGAAALGGTAANVAGAMSITDDAP
AGOKAAGAEILLOITGVEHLASSIALALMAARVTSLQVAGSAGAAALAAALVAGMSTDDAP
HADQDLKAGSSAATVGGDLALADYRDKTAAGAVAGSALVSTAAVSTAAVAPAVVTS
LITAGDILKAGSSAATVGGDLALADYRDKTAAGAVAGSALVSTAAVSTAAVAPAVVTS
SVTQVTEISKSARELAITGNANLKSVDVFRFVQERVAGPVVLAAGIDIASRGERPALT
FTPLAAPPEERRRRTKSEPTFEVEIVGKODRWRIRGAADITIDAKVYVSLVDVANGVLSKSID
VIGGGDQVLAASRIHVDVAGNVTVAALGRDSTVSDGERFVRVRLKOLNANVREGVATQTTA
YKRENNVYRVAERHARVQLVETVLEVCHTIGAGNDSTTGNHNFNMGSDDLGGAGNDTTL
GCEGQNTVGGAGDVFLODLVSWNQDLGGAGVDTKYNVHQPSEBERLERNMGDTGTHADLQKVEKMP
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WGTQDARHDLVIRGGSDVDTVYSGTGAAGIAGRIGLITADIGANRDKLGAGSSATDYSGLIEN
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AGNLIDGGDGRVTVSGRGLDGAKEVFLSLGKGFSLMDEPSTSVLRNENAVGSARDVTLIGDA
GANVNGAGNDVIRSGAGDVLGLDGSDDLFGAGNDLFGGGDDTVLFGVYGHDTIYESGCGHDT
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PQAAAAPPAARVPTLMQSLAVNRI
TOIG of: q57506 check: 4927 from: 1 to: 1706

LOCUS 057506 1706 aa linear ECT 15-MAR-2004
DEFINITION Bifunctional hemolysin-adenylate cyclase precursor (Cyclolysin)
(ACT) (AC-HLY) [Contains: Calmodulin-sensitive adenylyl cyclase
(ATP pyrophosphate-lyase) (Adenylyl cyclase); Hemolysin].
ACCESSION 057506
VERSION 057506 GI:34978374
SOURCE Swissprot: locus CYAA_BOBR, accession Q57506;
DBSOURCE class: standard.
extra accessions: O05179, created: Nov 1, 1997.
sequence updated: Oct 10, 2003.
annotation updated: Mar 15, 2004.
xref: gi: 11602642, gi: 11602643, gi: 33575039, gi: 33575359
xref: (non-sequence databases): HSBP40136, InterProIPR005165,
InterProIPR001343, InterProIPR003995, PfamPF03497, PfamPF00333,
PfamPF02382, PRINTSPR00313, PRINTSR01488, PROSITEPS00330
KEYWORDS Hemolysis; Virulence; CAMP biosynthesis; Lyase; Toxin; ATP-binding;
Calcium-binding; Calmodulin-binding; Repeat; Lipoprotein;
Palmitate; Whooping cough; Complete proteome.
SOURCE Bordetella bronchiseptica
ORGANISM Bordetella bronchiseptica
Bacteria; Proteobacteria; Betaproteobacteria; Burkholderiales;
Alcaligenaceae; Bordetella.
REFERENCE 1 (residues 1 to 1706)
Betsou, F., Simeiro, O., Danchin, A. and Guiso, N.
Cloning and sequence of the Bordetella bronchiseptica adenylyl
cyclase-hemolysin-encoding gene: comparison with the Bordetella
pertussis gene
JOURNAL Gene 162 (1), 165-166 (1995)
MEDLINE 96009899
REMARK SEQUENCE FROM N.A.
STRAIN-CIP 9.73
REFERENCE 2 (residues 1 to 1706)
Danchin, A. and Bouraux-Eude, C.
Direct Submission
JOURNAL Submitted (DEC-2000)
REMARK REVISIONS TO 1556-1559.
REFERENCE 3 (residues 1 to 1706)
Parchhill, J., Sebahia, M., Preston, A., Murphy, L.D., Thomson, N.,
Harris, D.E., Holden, M.T.G., Churcher, C.M., Bentley, S.D.,
Mungall, K.L., Cerdano-Tarraga, A.-M., Temple, L., James, K.,
Harris, B., Quail, M.A., Achtman, M., Atkin, R., Baker, S., Baham, D.,
Bason, N., Cherevach, I., Chillingworth, T., Collins, M., Cronin, A.,
Davis, P., Doggett, J., Feltwell, T., Goble, A., Hamlin, N., Hauser, H.,
Holroyd, S., Jorgels, K., Leather, S., Moulé, S., Norbertczak, H.,
O'Neill, S., Ormond, D., Price, C., Rabinowitsch, E., Rutter, S.,
Sanders, M., Saunders, D., Seeger, K., Sharp, S., Simmonds, M.,
Skelton, J., Squares, R., Squares, S., Stevens, K., Urwin, L.,
Whitehead, S., Barrell, B.G. and Maskell, D.J.
Comparative analysis of the genome sequences of Bordetella

JOURNAL Nat. Genet. 35 (1), 32-40 (2003)
MEDLINE 22827954
REMARK SEQUENCE FROM N.A.
STRAIN-RB50 / ATCC BAA-588
On Sep 23, 2003 this sequence version replaced gi:19864329.
COMMENT This SWISS-PROT entry is copyright. It is produced through a
collaboration between the Swiss Institute of Bioinformatics and
the EMBL outstation - the European Bioinformatics Institute.
The original entry is available from <http://www.ebi.ac.uk/seqdb/protein>
and <http://www.ebi.ac.uk/seqdb/protein>
[FUNCTION] This adenylyl cyclase belongs to a special class of
bacterial toxin. It causes whooping cough by acting on mammalian
cells by elevating CAMP-concentration and thus disrupts normal cell
function.
[CATALYTIC ACTIVITY] ATP = 3',5'-cyclic AMP + diphosphate.
[ENZYMATIC REGULATION] Activated by host calmodulin.
[SUBCELLULAR LOCATION] Secreted.
[DOMAIN] The gly-rich region is probably involved in binding
calcium, which is required for target cell-binding or cyclolytic
activity (by similarity).
[PTM] Released in a processed form.
[SIMILARITY] In the N-terminal section; belongs to the adenylyl
cyclase class-2 family.
[SIMILARITY] IN THE C-TERMINAL SECTION; BELONGS TO THE RTX
PROKARYOTIC TOXIN FAMILY.
FEATURES
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/note="HEMOLYSIN (BY SIMILARITY TO E. COLI HEMOLYSIN
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349..356
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400..912
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546..547
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/note="AA -> G (in Ref. 1)."

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TOIG of: np879578 check: 6141 from: 1 to: 1706

LOCUS NP_879578 1706 aa linear BCT 13-JAN-2004

DEFINITION bifunctional hemolysin-adenylate cyclase precursor [Bordetella pertussis Tohama I].

ACCESSION NP_879578

VERSION NP_879578.1 GI:33591934

DSOURCE REFSEQ: accession NC_002929.2

KEYWORDS

SOURCE Bordetella pertussis Tohama I

ORGANISM Bordetella pertussis Tohama I

REFERENCE 1 (residues 1 to 1706)

AUTHORS Parthill, J., Sebathia, M., Preston, A., Murphy, L.D., Thomson, N., Harris, D.B., Holden, M.T., Churcher, C.M., Bentley, S.D., Mungall, K.L., Cerdeno-Tarraga, A.M., Temple, L., James, K., Harris, B., Quail, M.A., Achtman, M., Atkin, R., Baker, S., Basham, D., Bason, N., Cherevach, I., Chillingworth, T., Collins, M., Cronin, A., Davis, P., Doggett, J., Feltwell, T., Goble, A., Hamlin, N., Hauser, H., Holroyd, S., Jørgensen, K., Leather, S., Moule, S., Norberczak, H., O'Neill, S., Ormond, D., Price, C., Rabinowitch, B., Rutter, S., Sanders, M., Saunders, D., Seeger, K., Sharp, S., Simmonds, M., Skelton, J., Squares, R., Squares, S., Stevens, K., Unwin, L., Whitehead, S., Barrett, B.G. and Maskell, D.J.

TITLE Comparative analysis of the genome sequences of Bordetella pertussis, Bordetella parapertussis and Bordetella bronchiseptica

JOURNAL Nat. Genet. 35 (1), 32-40 (2003)

MEDLINE 22827954

PubMed 12910271

REFERENCE 2 (residues 1 to 1706)

AUTHORS Sebathia, M.

TITLE Direct Submission

JOURNAL Submitted (06-AUG-2003) Submitted on behalf of the Pathogen Sequencing Unit, Sanger Institute, Wellcome Trust Genome Campus, Hinxton, Cambridge CB10 1SA E-mail: ms@sanger.ac.uk

COMMENT Method: conceptual translation.

FEATURES

source 1..1706

/organism="Bordetella pertussis Tohama I"

/strain="Tohama I"

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/product="bifunctional hemolysin-adenylate cyclase precursor"

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/coded_by="NC_002929.2:776228..781348"

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/transl_table=11

/db_xref="GeneID:2664492"

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SGDSVTYIARTRAASATGIDLRERIDILMKIARAGARSAGVTEARQRFIDGDMNIGVITDFELVR

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TOIG of: np882677 check: 4166 from: 1 to: 1740

LOCUS NP_882677 1740 aa linear BCT 13-JAN-2004

DEFINITION bifunctional hemolysin-adenylate cyclase precursor [Bordetella parapertussis].

ACCESSION NP_882677.1 GI:33595034

VERSION NP_882677.1

SOURCE REFSEQ: accession NC_002928.3

KEYWORDS complete genome.

SOURCE Bordetella parapertussis

ORGANISM Bordetella parapertussis

REFERENCE 1 Alcaligenaceae; Bordetella.

AUTHORS 1 (residues 1 to 1740)

1 Parkhill, D., Sebahia, M., Preston, A., Murphy, L. D., Thomson, N., Harris, D. E., Holden, M. T. G., Churcher, C. R., Bentley, S. D., Mungall, K. L., Cerdano-Tarraga, A. M., Temple, L., James, K., Harris, B., Quail, M. A., Achtman, M., Atkin, R., Baker, S., Basham, D., Bason, N., Chevreton, I., Chillingworth, T., Collins, M., Cronin, A., Davis, P., Doggett, U., Feltwell, T., Goble, A., Hamlin, N., Hauser, H., Holtroyd, S., Jagsels, K., Leather, S., Moulé, S., Norbertczak, H., O'Neill, S., Ormond, D., Price, C., Rabinowitsch, E., Rutter, S., Sanders, M., Saunders, D., Seeger, K., Sharp, S., Simmons, M., Skelton, J., Squares, R., Squares, S., Stevens, K., Unwin, L., Whitehead, S., Barrell, B. G. and Maskell, D. J.

TITLE Comparative analysis of the genome sequences of Bordetella pertussis, Bordetella parapertussis and Bordetella bronchiseptica

JOURNAL Nat. Genet. DOI, 10 (2003)

REFERENCE 2 (residues 1 to 1740)

AUTHORS Sebahia, M.

TITLE Direct Submission

JOURNAL Submitted (06-AUG-2003) Submitted on behalf of the Pathogen Sequencing Unit, Sanger Institute, Wellcome Trust Genome Campus, Hinxton, Cambridgeshire CB10 1SA E-mail: ms@sanger.ac.uk

COMMENT PROVISIONAL REFSEQ: This record has not yet been subject to final NCBI review. The reference sequence was derived from CAB40062.

Method: conceptual translation.

FEATURES

location/Qualifiers

1..1740

/organism="Bordetella parapertussis"

/strain="12822"

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/product="bifunctional hemolysin-adenylate cyclase precursor"

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1 np 882677.pep length: 1740 January 22, 2004 13:13 Type: P Check: 4166 ..

np882677

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/ TOIG of: np886873 check: 3378 from: 1 to: 1740
/ LOCUS NP_886873 1740 aa linear BCT 13-JAN-2004
/ DEFINITION bifunctional hemolysin-adenylate cyclase precursor [Bordetella
/ bronchiseptica RB50].
/ ACCESSION NP_886873
/ VERSION NP_886873.1 GI:33599313
/ DBSOURCE REFSEQ: accession NC_002927.3
/ KEYWORDS complete genome.
/ SOURCE Bordetella bronchiseptica RB50
/ ORGANISM Bordetella bronchiseptica RB50
/ Bacteria; Proteobacteria; Betaproteobacteria; Burkholderiales;
/ Alcaligenaceae; Bordetella.
/ REFERENCE 1 (residues 1 to 1740)
/ Parkhill,J., Sebailia,M., Preston,A., Murphy,L.D., Thomson,N.,
/ Harris,D.E., Holden,M.T., Churcher,C.M., Bentley,S.D.,
/ Mungall,K.L., Cerdano-Tarraga,A.M., Temple,L., James,K., Harris,B.,
/ Quail,M.A., Achtman,M., Atkin,R., Baker,S., Basham,D., Bason,N.,
/ Cherevach,I., Chillingworth,T., Collins,M., Cronin,A., Davis,P.,
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/ Holroyd,S., Jagsels,K., Leather,S., Moule,S., Norbertczak,H.,
/ O'Neill,S., Ormond,D., Price,C., Rabinowitch,E., Rutter,S.,
/ Sanders,M., Saunders,D., Seeger,K., Sharp,S., Simmonds,M.,
/ Skelton,J., Squares,R., Squares,S., Stevens,K., Unwin,L.,
/ Whitehead,S., Barrell,B.G. and Maskell,D.J.
/ Comparative analysis of the genome sequences of Bordetella
/ pertussis, Bordetella parapertussis and Bordetella bronchiseptica
/ Nat. Genet. 35 (1), 32-40 (2003)
/ JOURNAL MEDLINE 22827954
/ PUBMED 12910271
/ REFERENCE 2 (residues 1 to 1740)
/ Sebailia,M.
/ TITLE Direct Submission
/ JOURNAL Submitted (06-AUG-2003) Submitted on behalf of the Pathogen
/ Sequencing Unit, Sanger Institute, Wellcome Trust Genome Campus,
/ Hinxton, Cambridge CB10 1SA E-mail: ms@sanger.ac.uk
/ COMMENT PROVISIONAL REFSEQ: This record has not yet been subject to final
/ NCBI review. The reference sequence was derived from CAE30822.
/ Method: conceptual translation.
/ FEATURES
/ location/Qualifiers
/ source 1..1740
/ organism="Bordetella bronchiseptica RB50"
/ strain="RB50"
/ db_xref="taxon:257310"
/ Protein 1..1740
/ product="bifunctional hemolysin-adenylate cyclase
/ precursor"
/ BC_number="4.6.1.1"
/ 1..1740
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TOIG of: p15318 check: 6141 from: 1 to: 1706
LOCUS      P15318                      1706 aa          linear      BCT 15-MAR-2004
DEFINITION Bifunctional hemolysin-adenylate cyclase precursor (cyclolysin)
            (ACT) (AC-HLY) [contains: Calmodulin-sensitive adenylyl cyclase
            (ATP pyrophosphatase-lyase) (Adenylyl cyclase); Hemolysin].
ACCESSION  P15318 GI:34978355
VERSION    P15318
SOURCE     swissprot: locus CYAA_BORPE, accession P15318;
            class: standard.
            created: Apr 1, 1990.
            sequence updated: Oct 10, 2003.
            annotation updated: Mar 15, 2004.
            xrefs: gi: 39665, gi: 39666, gi: 412230, gi: 412231, gi: 580667,
            gi: 580668, gi: 33571514, gi: 33571578, gi: 39731, gi: 39732, gi:
            69555
            xrefs (non-sequence databases): HSSPP40136, InterProIPR005165,
            InterProIPR001343, InterProIPR003995, PfamPF03497, PfamPF00353,
            PfamPF02382, PRINTSPR00313, PRINTSPR01488, PROSITEPS00330
            Hemolysis; Virulence; CAMP biosynthesis; Lyase; Toxin; ATP-binding;
            Calcium-binding; Calmodulin-binding; Repeat; Lipoprotein;
            Palmitate; Whooping cough; Complete proteome.
SOURCE     Bordetella pertussis
ORGANISM   Bordetella pertussis
REFERENCE  1 (residues 1 to 1706)
AUTHORS    Glaser,P., Ladant,D., Sezer,O., Pichot,F., Ullmann,A. and
            Danchin,A.
TITLE      The calmodulin-sensitive adenylyl cyclase of Bordetella pertussis:
            cloning and expression in Escherichia coli
JOURNAL    Mol. Microbiol. 2 (1), 19-30 (1988)
MEDLINE    88216178
REMARK     SEQUENCE FROM N.A.
            STRAIN=18323
REFERENCE  2 (residues 1 to 1706)
AUTHORS    Parkhill,J., Sebailha,M., Preston,A., Murphy,L.D., Thomson,N.,
            Harris,D.E., Holden,M.T.G., Churcher,C.M., Bentley,S.D.,
            Mungall,K.L., Cerdano-Tarraga,A.-M., Temple,L., James,K.,
            Harris,B., Quail,M.A., Achtman,M., Alkhn,R., Baker,S., Basham,D.,
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            Davis,P., Doggett,K., Felwell,T., Goble,A., Hamlin,N., Hauser,H.,
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            Sanders,M., Saunders,D., Seeger,K., Sharp,S., Simmonds,M.,
            Skelton,J., Squares,R., Stevens,K., Unwin,L.,
            Whitehead,S., Barrett,B.G. and Maskell,D.J.
TITLE      Comparative analysis of the genome sequences of Bordetella
            pertussis, Bordetella parapertussis and Bordetella bronchiseptica
JOURNAL    Nat. Genet. 35 (1), 32-40 (2003)
MEDLINE    22827954
REMARK     SEQUENCE FROM N.A.
            STRAIN=Tohama I / ATCC BAA-589 / NCTC 13251
REFERENCE  3 (residues 1 to 1706)
AUTHORS    Glaser,P., Sakamoto,H., Bellalou,J., Ullmann,A. and Danchin,A.
TITLE      Secretion of cyclolysin, the calmodulin-sensitive adenylyl
            cyclase-hemolysin bifunctional protein of Bordetella pertussis
JOURNAL    EMBO J. 7 (12), 3997-4004 (1988)
MEDLINE    89091151
REMARK     SEQUENCE OF 1489-1706 FROM N.A., AND BIFUNCTIONAL PROTEIN
            DESCRIPTION.
            STRAIN=18323
REFERENCE  4 (residues 1 to 1706)
AUTHORS    Munier,H., Gilles,A.M., Glaser,P., Krin,E., Danchin,A., Sarfati,R.
            and Barzu,O.
TITLE      Isolation and characterization of catalytic and calmodulin-binding
            domains of Bordetella pertussis adenylyl cyclase
JOURNAL    Eur. J. Biochem. 196 (2), 469-474 (1991)
MEDLINE    91177021
REMARK     DOMAINS.
            5 (residues 1 to 1706)
REFERENCE  Glaser,P., Elmaoglou-Lazaridou,A., Krin,E., Ladant,D., Barzu,O. and
            Danchin,A.
            TITLE
            IDENTIFICATION OF RESIDUES ESSENTIAL FOR CATALYSIS AND BINDING OF
            CALMODULIN IN BORDETELLA PERTUSSIS ADENYLYL CYCLASE BY
            SITE-DIRECTED MUTAGENESIS
            JOURNAL    EMBO J. 8 (3), 967-972 (1989)
            MEDLINE    89251630
            REMARK     MUTAGENESIS.
            6 (residues 1 to 1706)
REFERENCE  Glaser,P., Munier,H., Gilles,A.M., Krin,E., Porcumb,T., Barzu,O.,
            Sarfati,R., Pelleuer,C. and Danchin,A.
TITLE      Functional consequences of single amino acid substitutions in
            calmodulin-activated adenylyl cyclase of Bordetella pertussis
JOURNAL    EMBO J. 10 (7), 1683-1688 (1991)
MEDLINE    91266896
REMARK     MUTAGENESIS.
            7 (residues 1 to 1706)
REFERENCE  Danchin,A.
TITLE      Phylogeny of adenylyl cyclases
JOURNAL    Adv. Second Messenger Phosphoprotein Res. 27, 109-162 (1993)
MEDLINE    93119764
REMARK     REVIEW.
            8 (residues 1 to 1706)
REFERENCE  Hackett,M., Guo,L., Shabanowitz,J., Hunt,D.F. and Hewlett,E.L.
TITLE      Internal lysine palmitoylation in adenylyl cyclase toxin from
            Bordetella pertussis
JOURNAL    Science 266 (5184), 433-435 (1994)
MEDLINE    95025937
REMARK     PALMITOYLATION OF LYS-983.
            9 (residues 1 to 1706)
REFERENCE  Basar,T., Havlicek,V., Bezouskova,S., Halada,P., Hackett,M. and
            Sedo,P.
TITLE      The conserved lysine 860 in the additional fatty-acylation site of
            Bordetella pertussis adenylyl cyclase is crucial for toxin
            function independently of its acylation status
JOURNAL    J. Biol. Chem. 274 (16), 10777-10783 (1999)
MEDLINE    99214144
REMARK     PALMITOYLATION OF LYS-860.
            On Sep 22, 2003 this sequence version replaced gi:117789.
            COMMENT
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            This SWISS-PROT entry is copyright. It is produced through a
            collaboration between the Swiss Institute of Bioinformatics and
            the EMBL Outstation - the European Bioinformatics Institute.
            The original entry is available from http://www.expasy.ch/sprot
            and http://www.ebi.ac.uk/sprot
            [FUNCTION] This adenylyl cyclase belongs to a special class of
            bacterial toxin. It causes whooping cough by acting on mammalian
            cells by elevating cAMP-concentration and thus disrupts normal cell
            function.
            [CATALYTIC ACTIVITY] ATP = 3',5'-cyclic AMP + diphosphate.
            [ENZYME REGULATION] Activated by host calmodulin.
            [SUBCELLULAR LOCATION] Secreted.
            [DOMAIN] The Gly-rich region is probably involved in binding
            calcium, which is required for target cell-binding or cyclolytic
            activity (By similarity).
            [PM] Released in a processed form.
            [PM] Palmitoylated by CYAC. The toxin only becomes active when
            modified in position Lys-983.
            [SIMILARITY] In the N-terminal section, belongs to the adenylyl
            cyclase class-2 family.
            [SIMILARITY] IN THE C-TERMINAL SECTION, BELONGS TO THE RTX
            PROKARYOTIC TOXIN FAMILY.
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TOIG of: q57506 check: 4927 from: 1 to: 1706
LOCUS       Q57506                1706 aa linear BCT 15-MAR-2004
DEFINITION  Bifunctional hemolysin-adenylate cyclase precursor (Cyclolysin)
            (ACT) (AC-HLY) [Contains: Calmodulin-sensitive adenylate cyclase
            (ATP pyrophosphatase-lyase) (Adenyllyl cyclase); Hemolysin].
ACCESSION   Q57506
VERSION     057506 GI:34978374
SOURCE      SwissProt: locus CYAA_BORBR, accession Q57506;
            class: standard.
            extra accessions: Q05179, created: Nov 1, 1997.
            sequence updated: Oct 10, 2003.
            annotation updated: Mar 15, 2004.
            xrefs: gi: 11602642, gi: 11602643, gi: 33575039, gi: 33575359
            xrefs (non-sequence databases): HSPFP0136, InterPro:IPR005165,
            InterPro:IPR001343, InterPro:IPR003995, Pfam:PF03497, Pfam:PF00353,
            Pfam:PF02382, PRINTS:PR00313, PRINTS:PR0148, PROSITE:PS00330
KEYWORDS     Hemolysin; Virulence; CAMP biosynthesis; Lyase; Toxin; ATP-binding;
            Calcium-binding; Calmodulin-binding; Repeat; Lipoprotein;
            Palmitate; Whooping cough; Complete proteome.
SOURCE      Bordetella bronchiseptica
ORGANISM    Bordetella bronchiseptica
            Bacteria; Proteobacteria; Betaproteobacteria; Burkholderiales;
            Alcaligenaceae; Bordetella.
REFERENCE   1 (residues 1 to 1706)
AUTHORS     Betsou, F., Sismelio, O., Danchin, A. and Guiso, N.
TITLE       Cloning and sequence of the Bordetella bronchiseptica adenylate
            cyclase-hemolysin-encoding gene: comparison with the Bordetella
            pertussis gene
JOURNAL     Gene 162 (1), 165-166 (1995)
MEDLINE     96009899
REMARK      SEQUENCE FROM N. A.
            STRAIN=CIP 9.73
REFERENCE   2 (residues 1 to 1706)
AUTHORS     Danchin, A. and Boursaux-Eude, C.
TITLE       Direct Submission
JOURNAL     Submitted (-DEC-2000)
REMARK      REVISIONS TO 1556-1559.
            3 (residues 1 to 1706)
            Parkhill, J., Sebatina, M., Preston, A., Murphy, L. D., Thomson, N.,
            Harris, D. E., Holden, M. T. G., Churcher, C. M., Bentley, S. D.,
            Mungall, K. L., Cerdano-Tarraga, A.-M., Temple, L., James, K.,
            Hargill, B., Quail, M. A., Achtman, M., Atkin, R., Baker, S., Basham, D.,
            Bauman, N., Cherevach, I., Chillingworth, T., Collins, M., Cronin, A.,
            Davis, P., Doggett, J., Feltwell, T., Gobie, A., Hamlin, N., Hauser, H.,
            Holroyd, S., Jagels, K., Leather, S., Moute, S., Norberczak, H.,
            O'Neill, S., Ormond, D., Price, C., Rabinowitsch, E., Rutter, S.,
            Sanders, M., Saunders, D., Seeger, K., Sharp, S., Simmonds, M.,
            Skelton, J., Squares, R., Squares, S., Stevens, K., Unwin, L.,
            Whitehead, S., Barrall, B. G. and Maskell, D. J.
            Comparative analysis of the genome sequences of Bordetella
            pertussis, Bordetella parapertussis and Bordetella bronchiseptica
            Nat. Genet. 35 (1), 32-40 (2003)
JOURNAL     22827954
MEDLINE
REMARK      SEQUENCE FROM N. A.
            STRAIN=RB50 / ATCC BAA-588
            On Sep 23, 2003 this sequence version replaced gi:19864329.
COMMENT     This SWISS-PROT entry is copyright. It is produced through a
            collaboration between the Swiss Institute of Bioinformatics and
            the EMBL outstation - the European Bioinformatics Institute.
            The original entry is available from http://www.ebi.ac.uk/prot
            and http://www.ebi.ac.uk/prot
            [FUNCTION] This adenylate cyclase belongs to a special class of
            bacterial toxin. It causes whooping cough by acting on mammalian
            cells by elevating cAMP-concentration and thus disrupts normal cell
            function.
            [CATALYTIC ACTIVITY] ATP = 3',5'-cyclic AMP + diphosphate.
            [ENZYME REGULATION] Activated by host calmodulin.
            [SUBCELLULAR LOCATION] Secreted.
            [DOMAIN] The Gly-rich region is probably involved in binding
            calcium, which is required for target cell-binding or cytolytic

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